



Exploring the Potential Relationship between Low Serum Ferritin Levels and Mental Illness in Psychiatric Patients

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ABSTRACT

Serum ferritin, a protein that stores iron in the body, plays a crucial role in our overall health. While its primary function is to store iron for future use, recent research has uncovered a fascinating connection between low serum ferritin levels and mental health. This study delves into the impact of low serum ferritin on mental health. This cross-sectional study was conducted to investigate the relationship between iron status markers (hemoglobin and iron) and psychiatric disorders in a sample of 40 patients. Male patients showed a mean hemoglobin (HGB) of 14.43 g/dL, well within the standard reference range (13.5-17.5 g-dL). Male patients exhibited an average ferritin level of 96.58 ng/mL. The maintenance of normal iron parameters suggests that iron deficiency may not be a significant contributing factor in this psychiatric population, and routine iron supplementation is not necessary for patients with similar profiles. This study showed that the maintenance of iron parameters might be influenced by the iron status of the patients, which may be related to mental illness, such as depression, anxiety, schizophrenia, or bipolar disorder.

Keywords:

Ferritin, Iron, Mental Health, Psychiatric Population, Depression.

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INTRODUCTION

Ferritin is primarily found in the liver, spleen, and bone marrow, where they store iron and release it when needed. Iron is essential for the production of hemoglobin, a protein in red blood cells that carries oxygen throughout the body. Without adequate iron levels, our bodies cannot function optimally [1]. Iron deficiency, which often manifests as low serum ferritin, can lead to feelings of fatigue, irritability, and difficulty concentrating [2]. Low serum ferritin levels have been found to have a significant impact on mental health. Studies have also shown a strong correlation between low ferritin and depression, anxiety, and other mental health disorders [3].

Research suggests that iron plays a crucial role in the production of neurotransmitters, such as dopamine and serotonin, which regulate mood and emotions. When iron level is depleted, the production of these neurotransmitters is disrupted, leading to imbalances that can contribute to mental health issues. Low serum ferritin has been linked to several common mental health conditions [4]. Depression, for example, is often associated with low iron levels. Studies have shown that individuals with depression are more likely to have lower serum ferritin levels compared to those without depression. Similarly, anxiety disorders have been found to be more prevalent in individuals with low serum ferritin [5].

The connection between low ferritin and anxiety may be attributed to the impact of iron on neurotransmitter regulation. Imbalances in neurotransmitters can contribute to increased anxiety and heightened stress responses [6].

Additionally, attention-deficit hyperactivity disorder (ADHD) has also been associated with low serum ferritin. Studies have shown that children with ADHD often have lower iron stores compared to their peers without ADHD. While the exact mechanisms behind this association are still being researched, it highlights the importance of maintaining optimal ferritin levels for mental health [7]. Therefore, this study aimed to explore the potential relationship between low serum ferritin levels and mental illness by measuring both serum ferritin and haemoglobin levels in psychiatric patients who diagnosed with depression, anxiety, schizophrenia, or bipolar disorder.

Method

This cross-sectional study was conducted to investigate the relationship between low serum ferritin level and mental illnesses. The target population of this study were admitted Adult (age 18–65 years) psychiatric patients in one of the largest Psychiatric hospitals in Libya, at Tripoli city, Razi Psychiatric Hospital. These psychiatric patients diagnosed with mental disorders such as major depressive disorder, bipolar disorder, schizophrenia, or other psychiatric conditions. Patients not undergoing treatment for known iron deficiency anaemia. The ethical approve was obtained from Ethical Committee of the Razi Hospital, before data collection and participants' data were anonymized and stored securely to ensure privacy. Permission was obtained from the hospital administration to review the patient's files and the records of Haemoglobin levels was used as data in this study. haemoglobin levels less than 12 g/dL for women and less

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than 13 g/dL for men considered low [8]. For ferritin levels, blood samples were collected from participants to measure serum ferritin concentrations using immunoassay method, and then use them as data for this study. Serum ferritin levels less than 30 ng/mL are considered low [9] and typically indicative of depleted iron stores. Data of Haemoglobin levels and serum ferritin levels of 40 participants were collected during June 2024 then analysed using SPSS version 26.

Result

The results assessed whether there is a correlation between low iron stores, as indicated by haemoglobin and serum ferritin levels, and psychiatric disorders. Table 1 shows the distribution of 40 patients based on age group. There is a fairly even spread of patients across the different adult age groups from 21 to 60 years old. The 51-60 years group has slightly more patients than the other groups. There are no patients under 21 or over 60 in this sample.

Table 1. Patients' distribution based on age

Age group	Count	%
21-30	10	25.0
31-40	9	20.0
41-50	10	25.0
51-60	12	30.0
Total	40	100.0

Table 2 shows that the average HGB level is higher in the sample of 32 male patients (14.43 g/dL) compared to the 8 female patients (11.93 g/dL). Both averages fall within the standard reference ranges for their respective genders. The t-value of 1.24 for males suggests there is not sufficient evidence to conclude the actual average HGB level in the psychiatric male population differs from the normal reference range for males (13.5-17.5 g/dL). For females, the small negative t-value (-0.17) and high p-value (0.436) suggests no significant difference between the sample mean and the population mean. This analysis finds there is no evidence that HGB levels in psychiatric male patients differ meaningfully from healthy males. Also, there is no evidence that HGB levels in psychiatric female patients differ meaningfully from healthy females.

Table 2. HGB for males and females' patients with psychological and mental illnesses

Variable	Gender	N	Standard value	Mean	Standard deviation	T value	P-value
HGB	Male	32	13.5-17.5	14.43	1.24	1.24	0.899
	Female	8	12.0-15.5	11.93	1.18	-0.17	0.436

From the results presented in table 3, the average ferritin level is higher in the 32 male patients (96.58 ng/mL) compared to the 8 females (64.23 ng/mL). Both averages fall within the expected genders ranges. The t-tests and p-values assess if the mean ferritin levels differ significantly from the population norms. For both genders, the t-statistics and high p-values suggest no significant deviation between the sample means and healthy reference ranges.

Table 3. Test ferritin for males and females' patients with psychological and mental illnesses

Variable	Gender	N	Standard value	Mean	Standard deviation	T value	P-value
Ferritin	Male	32	20-250	96.58	63.00	0.50	0.690
	Female	8	10-120	64.23	28.55	1.41	0.899

Discussion

The present study investigated the relationship between iron status markers (hemoglobin and ferritin) and psychiatric disorders in a sample of 40 patients. The age distribution of participants showed a relatively balanced representation across adult age groups (21-60 years), with a slight predominance in the 51-60 years category (30%). The gender distribution was notably skewed, with males representing 80% (n=32) and females 20% (n=8) of the sample.

The analysis of hemoglobin (HGB) levels revealed several key findings. Male patients showed a mean HGB of 14.43 g/dL, well within the standard reference range (13.5-17.5 g/dL). Female patients demonstrated a mean HGB of 11.93 g/dL, slightly below but not significantly different from the reference range (12.0-15.5 g/dL). Statistical analysis (t-tests) indicated no significant deviation from normal reference ranges for either gender. These findings suggest that psychiatric disorders in this sample are not associated with clinically significant alterations in hemoglobin levels, contrasting with some previous studies that have suggested links between anemia and mental health conditions. Where, iron considered being very important for brain function, cognition, and behavior [10].

On the same way, the ferritin analysis yielded similar results. Male patients exhibited a mean ferritin level of 96.58 ng/mL. Similarly, female patients showed a mean ferritin level of 64.23 ng/mL. Both genders-maintained ferritin levels within normal ranges, with no statistically significant deviations. The lack of significant differences between psychiatric patients and healthy individuals suggests that ferritin levels are not a major factor in the development or progression of psychological and mental illnesses in this sample. Thus, the maintenance of normal iron parameters suggests that iron deficiency may not be a significant contributing factor in this psychiatric population, and routine iron supplementation may not be necessary for psychiatric patients with similar profile. However, studies have found that reduced serum-ferritin may lead to changes in mental and cerebral mechanisms, emotion, and behaviour [11]. As a recommendation, future research with larger, more balanced samples and specific psychiatric diagnosis considerations would be valuable in further exploring these relationships.

Conclusion

Low serum ferritin levels can have a significant impact on mental health. Depression, anxiety, and ADHD are among the common mental health conditions associated with low ferritin. This study will contribute to understanding the possible relationship between low serum ferritin levels and mental illness. While causality cannot be confirmed, identifying significant correlations could provide insights into the role of iron deficiency in psychiatric disorders, potentially leading to more comprehensive treatment approaches that address both mental and physical

health. Future longitudinal studies could be designed to explore causal pathways.

References

1. Theil E, Chen H, Miranda C, Janser H, Elsenhans B, Núñez M, et al. Absorption of Iron from Ferritin Is Independent of Heme Iron and Ferrous Salts in Women and Rat Intestinal Segments. [Internet]. SciVee2012; Available from: <https://doi.org/10.4016/39302.01>
2. Stockman JA. Intravenous iron for the treatment of fatigue in nonanemic, premenopausal women with low serum ferritin concentration. Yearbook of Pediatrics [Internet] 2012;2013:53–4.
3. Abdaljawad S, Qiteesh H, Abdelgader A, Saed W. Serum Ferritin Level and Alopecia Areata in Pediatric Patients. AlQalam Journal of Medical and Applied Sciences. 2022 Oct 30:527-33.
4. Oni J, Nyokong T. Interaction between iron(II) tetrasulfophthalocyanine and the neurotransmitters, serotonin and dopamine. Polyhedron [Internet] 2000;19(11):1355–61.
5. Bora M, Gogoi S, Bora P. Study on levels of serum iron and serum ferritin in adolescent depression in a tertiary care hospital. International Journal of Scientific Research [Internet] 2020;1–4.
6. Printz C. Anxiety and depression may contribute to an increased risk of death in some cancers. Cancer [Internet] 2017;123(13):2389. Available from: <https://doi.org/10.1002/cncr.30812>
7. Attention Deficit Hyperactivity Disorder (ADHD): Education for Patients and the Public [Internet]. In: Exon Publications eBooks. 2024. page 1–11.
8. Brandt LJ, Feuerstadt P, Longstreth GF, Boley SJ. ACG Clinical Guideline: Epidemiology, risk factors, Patterns of presentation, diagnosis, and Management of Colon Ischemia (CI). The American Journal of Gastroenterology [Internet] 2015;110(1):18–44.
9. Aapro M, Beguin Y, Bokemeyer C, Dicato M, Gascón P, Glaspy J, et al. Management of anaemia and iron deficiency in patients with cancer: ESMO Clinical Practice Guidelines. Annals of Oncology [Internet] 2017;29:iv96–110.
10. Looker AC. Prevalence of Iron Deficiency in the United States. JAMA [Internet] 1997;277(12):973.
11. Kim KM, Hwang HR, Kim YJ, Lee JG, Yi YH, Tak YJ, et al. Association between Serum-Ferritin Levels and Sleep Duration, Stress, Depression, and Suicidal Ideation in Older Koreans: Fifth Korea National Health and Nutrition Examination Survey 2010–2012. Korean Journal of Family Medicine [Internet] 2019;40(6):380–7.